WE CLAIM:

1. A cloned bacterial organophosphorus acid anhydrase gene fragment comprising the DNA coding sequence:

```
5'
          CTGCAGCCTGACTCGGCACCAGTCCCTGCAAGCAGAGTCGTAAGCAATCGCAAGGGGGCAGC
ATG CAA ACG AGA AGG GTT GTG CTC AAG TCT GCG GCC GCA GGA ACT CTG CTC GGC
met gln thr arg arg val val leu lys ser ala ala ala gly thr leu leu gly

GGC CTG GCT GGG TGC GCG ACG TGG CTG GAT CGA TCG GCA CAG GCG ATC GGA TCA
gly leu ala gly cys ala thr trp leu asp arg ser ala gln ala ile gly ser

ATA CGT GCG CGT CCT ATC ACA ATC TCT GAA GCG GGT TTC ACA CTG ACT CAC GAG
ile arg ala arg pro ile thr ile ser glu ala gly phe thr leu thr his glu

GAC ATC TGC GGC AGC TCG GCA GGA TTC TTG CGT GCT TGG CCA GAG TTC TTC GGT
asp ile cys gly ser ser ala gly phe leu arg ala trp pro glu phe phe gly

AGC CGC AAA GCT CTA GCG GAA AAG GCT GTG AGA GGA TTG CGC GCC AGA GCG GCT
ser arg lys ala leu ala glu lys ala val arg gly leu arg ala arg ala ala

GGC GTG CGA ACG ATT GTC GAT GTC TCG ACT TTC GAT ATC GGT CGC GAC GTC AGT
gly val arg thr ile val asp val ser thr phe asp ile gly arg asp val ser

TTA TTG GCC GAG GTT TCG CGG GCT GCC GAC GTT CAT ATC GTG GCG GCG ACC GGC
leu leu ala glu val ser arg ala ala asp val his ile val ala ala thr gly

TTG TGG TTC GAC CCG CCA CTT TCG ATG CGA TTG AGG TAT GTA GAG GAA CTC ACA
leu trp phe asp pro pro leu ser met arg leu arg tyr val glu glu leu thr

CAG TTC TTC CTG CGT GAG ATT CAA TAT GGC ATC GAA GAC ACC GGA ATT AGG GCG
gln phe phe leu arg glu ile gln tyr gly ile glu asp thr gly ile arg ala

GGC ATT ATC AAG GTC GCG ACC ACA GGC AAG GCG ACC CCC TTT CAG GAG TTA GTG
gly ile ile lys val ala thr thr gly lys ala thr pro phe gln glu leu val

TTA AAG GCG GCC GCC CGG GCG AGC TTG GCC ACG GGT GTT CCG GTA ACC ACT CAC
leu lys ala ala ala arg ala ser leu ala thr gly val pro val thr thr his

ACG GCA GCA AGT CAG CGC GAT GGT GAG CGA GGC AGG CCG CCA TTT TTG AGT CCG
thr ala ala ser gln arg asp gly glu arg gly arg pro pro phe leu ser pro

AAG CTT GAG CCC TCA CGG GTT TGT ATT GGT CAC AGC GAT GAT ACT GAC GAT TTG
lys leu glu pro ser arg val cys ile gly his ser asp asp thr asp asp leu

AGC TAT CTC ACC GGC CTG CTG CGC GGA TAC TTC ATC GGT CTA GAC CAC ATC CCG
ser tyr leu thr gly leu leu arg gly tyr leu ile gly leu asp his ile pro

CAC AGT GCG ATT GGT CTA GAA GAT AAT GCG AGT GCA TCA CCG CTC CTG GGC ATC
his ser ala ile gly leu glu asp asn ala ser ala ser pro leu leu gly ile

CGT TCG TGG CAA ACA CGG GCT CTC TTG ATC AAG GCG CTC ATC GAC CAA GGC TAC
arg ser trp gln thr arg ala leu leu ile lys ala leu ile asp gln gly tyr

ATG AAA CAA ATC CTC GTT TCG AAT GAC TGG CTG TTC GGG TTT TCG AGC TAT GTC
met lys gln ile leu val ser asn asp trp leu phe gly phe ser ser tyr val

ACC AAC ATC ATG GAC GTG ATG GAT CGC GTG AAC CCC GAC GGG ATG GCC TTC ATT
thr asn ile met asp val met asp arg val asn pro asp gly met ala phe ile

CCA CTG AGA GTG ATC CCA TTC TAC GAG AGA AGG GCG TCC CAC AGG AAA CGC TGC
pro leu arg val ile pro phe tyr glu arg arg ala ser his arg lys arg cys

CAG GCA TCA CTG TGA
gln ala ser leu  .
GTAACCCGGCGCGGTTCTGTGTCACCGACTTGCCGTGCATGACGCCATCTGGATCCTTCCACGCAGCGGCC
ACTATTCCCCGTCAAGATACCGAACGATGAAGTCGCGGCATCGATCGATAGGCATCTTCAATGTGATCAGGG
CTGCCACCTTCCAAAGCCGGTGGCCACCCCTGTCGATAGTCTTGAGGGACGGTAGCGACGACCGTGCTTTTC
GTGAACTGCAG
3'
```

2. The gene fragment of claim 1 wherein said fragment is substantially free of extraneous DNA.

3. The gene fragment of claim 1 where the DNA is plasmid DNA.

4. The gene fragment of claim 1 where the source of the DNA is bacteria of the genus Flavobacterium.

5. The gene fragment of claim 1 where the source of the DNA is bacteria of the genus Pseudomonas.

6. An expression vector for producing bacterial organophosphorous acid anhydrase, said vector comprising a cloned bacterial organophosphorus acid anhydrase gene fragment having the DNA coding sequence:

```
5'
          CTGCAGCCTGACTCGGCACCAGTCGCTGCAAGCAGAGTCGTAAGCAATCGCAAGGGGGCAGC
ATG CAA ACG AGA AGG GTT GTG CTC AAG TCT GCG GCC GCA GGA ACT CTG CTC GGC
met gln thr arg arg val val leu lys ser ala ala ala gly thr leu leu gly

GGC CTG GCT GGG TGC GCG ACG TGG CTG GAT CGA TCG GCA CAG GCG ATC GGA TCA
gly leu ala gly cys ala thr trp leu asp arg ser ala gln ala ile gly ser

ATA CGT GCG CGT CCT ATC ACA ATC TGT GAA GCG GGT TTC ACA CTG ACT CAC GAG
ile arg ala arg pro ile thr ile ser glu ala gly phe thr leu thr his glu

GAC ATC TGC GGC AGC TCG GCA GGA TTC TTG CGT GCT TGG CCA GAG TTC TTC GGT
asp ile cys gly ser ser ala gly phe leu arg ala trp pro glu phe phe gly

AGC CGC AAA GCT CTA GCG GAA AAG GCT GTG AGA GGA TTG CGC GCC AGA GCG GCT
ser arg lys ala leu ala glu lys ala val arg gly leu arg ala arg ala ala

GGC GTG CGA ACG ATT GTC GAT GTG TCG ACT TTT GAT ATC GGT CGC GAC GTC AGT
gly val arg thr ile val asp val ser thr phe asp ile gly arg asp val ser

TTA TTG GCC GAG GTT TCG CGG GCT GCC GAC GTT CAT ATC GTG GCG GCG ACC GGC
leu leu ala glu val ser arg ala ala asp val his ile val ala ala thr gly

TTG TGG TTC GAC CCG CCA CTT TCG ATG CGA TTG AGG TAT GTA GAG GAA CTC ACA
leu trp phe asp pro pro leu ser met arg leu arg tyr val glu glu leu thr

CAG TTC TTC CTG CGT GAG ATT CAA TAT GGC ATC GAA GAC ACC GGA ATT AGG GCG
gln phe phe leu arg glu ile gln tyr gly ile glu asp thr gly ile arg ala

GGC ATT ATC AAG GTC GCG ACC AGA GGC AAG GCG ACC CCC TTT CAG GAG TTA GTG
gly ile ile lys val ala thr thr gly lys ala thr pro phe gln glu leu val

TTA AAG GCG GCC GCC CGG GCG AGC TTG GCC ACC GGT GTT CCG GTA ACC ACT CAC
leu lys ala ala ala arg ala ser leu ala thr gly val pro val thr thr his

ACG GCA GCA AGT CAG CGC GAT GGT GAG CGA GGC AGG CCG CCA TTT TTG AGT CCG
thr ala ala ser gln arg asp gly glu arg gly arg pro pro phe leu ser pro

AAG CTT GAG CCC TCA TGG GTT TGT ATT GGT CAC AGC GAT GAT ACT GAC GAT TTG
lys leu glu pro ser arg val cys ile gly his ser asp asp thr asp asp leu

AGC TAT CTC ACC GCC CTG CTG CGC GGA TAC CTC ATC GGT CTA GAC CAC ATC CCG
ser tyr leu thr ala leu leu arg gly tyr leu ile gly leu asp his ile pro

CAC AGT GCG ATT GGT CTA GAA GAT AAT GCG AGT GCA TCA CCG CTC CTG GGC ATC
his ser ala ile gly leu glu asp asn ala ser ala ser pro leu leu gly ile

CGT TCG TGG CAA ACA CGG GCT CTC TTG ATC AAG GCG CTC ATC GAC CAA GGC TAC
arg ser trp gln thr arg ala leu leu ile lys ala leu ile asp gln gly tyr

ATG AAA CAA ATC CTC GTT TCG AAT GAC TGG CTG TTC GGG TTT TCG AGC TAT GTC
met lys gln ile leu val ser asn asp trp leu phe gly phe ser ser tyr val

ACC AAC ATC ATG GAC GTG ATG GAT CGC GTG AAC CCC GAC GGG ATG GCC TTC ATT
thr asn ile met asp val met asp arg val asn pro asp gly met ala phe ile

CCA CTG AGA GTG ATC CCA TTC TAC GAG AGA AGG GCG TCC CAC AGG AAA CGC TGC
pro leu arg val ile pro phe tyr glu arg arg ala ser his arg lys arg cys

CAG GCA TCA CTG TGA
gln ala ser leu  .
CTAACCCGGCGCGGTTCTGTGTCACCGACTTGCCGTGCATGACGCCATCTGGATCCTTCCACGCAGCGGCC
ACTATTCCCCGTCAAGATACCGAACGATGAAGTCGCGCATCGATCGATAGGCATCTTCAATGTGATCAGGG
CTGCCACCTCCAAAGCCGGTGGCCACCCCTGTCGATAGTCTTGAGGGACGGTAGCGACGACCGTGCTTTTC
GTGAACTGCAG
3'
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7. The expression vector of claim 6 further comprising a promoter, a start codon, and a recombinant DNA sequence coding for bacterial organophosphorus acid anhydrase in accurate reading frame sequence with said start codon for translation.

8. The expression vector of claim 7 wherein said vector is derived from a baculovirus.

9. The expression vector of claim 7 wherein said vector is a bacteriophage.

10. The expression vector of claim 7 wherein said vector is a plasmid.

11. The expression vector of claim 10 wherein said plasmid comprises a transposon capable of transposing the Drosophila genome.

12. A transformed microorganism comprising an expression vector for producing bacterial organophosphorus acid anhydrase wherein said vector has a cloned bacterial organophosphorus acid anhydrase gene fragment with the DNA coding sequence:

```
5'
          CTGCAGCCTGACTCGGCACCAGTCGCTGCAAGCAGAGTCGTAAGCAATGGCAAGGGGGCAGC
ATG CAA ACG AGA AGG GTT GTG CTC AAG TCT GCG GCC GCA GGA ACT CTG CTC GGC
met gln thr arg arg val val leu lys ser ala ala ala gly thr leu leu gly

GGC CTG GCT GGG TGC GCG ACG TGG CTG GAT CGA TCG GCA CAG GCG ATC GGA TCA
gly leu ala gly cys ala thr trp leu asp arg ser ala gln ala ile gly ser

ATA CGT GCG CGT CCT ATC ACA ATC TCT GAA GCG GGT TTC ACA CTG ACT CAC GAG
ile arg ala arg pro ile thr ile ser glu ala gly phe thr leu thr his glu

GAC ATC TGC GGC AGC TCG GCA GGA TTC TTG CGT GCT TGG CCA GAG TTC TTC GGT
asp ile cys gly ser ser ala gly phe leu arg ala trp pro glu phe phe gly

AGC CGC AAA GCT CTA GCG GAA AAG GCT GTG AGA GGA TTG CGC GCC AGA GCG GCT
ser arg lys ala leu ala glu lys ala val arg gly leu arg ala arg ala ala

GGC GTG CGA ACG ATT GTC GAT GTG TCG ACT TTC GAT ATC GGT CGC GAC GTC AGT
gly val arg thr ile val asp val ser thr phe asp ile gly arg asp val ser

TTA TTG GCC GAG GTT TCG CGG GCT GCC GAC GTT CAT ATC GTG GCG GCG ACC GGC
leu leu ala glu val ser arg ala ala asp val his ile val ala ala thr gly

TTG TGG TTC GAC CCG CCA CTT TCG ATG CGA TTG AGG TAT GTA GAG GAA CTC ACA
leu trp phe asp pro pro leu ser met arg leu arg tyr val glu glu leu thr

CAG TTC TTC CTG CGT GAG ATT CAA TAT GGC ATC GAA GAC ACC GGA ATT AGG GCG
gln phe phe leu arg glu ile gln tyr gly ile glu asp thr gly ile arg ala

GGC ATT ATC AAG GTC GCG ACC ACA GGC AAG GCG ACC CCC TTT CAG GAG TTA GTG
gly ile ile lys val ala thr thr gly lys ala thr pro phe gln glu leu val

TTA AAG GCG GCC GCC CGG GCC AGC TTG GCC ACC GGT GTT CCG GTA ACC ACT CAC
leu lys ala ala ala arg ala ser leu ala thr gly val pro val thr thr his

ACG GCA GCA AGT CAG CGC GAT GGT GAG CGA GGC AGG CCG CCA TTT TTG AGT CCG
thr ala ala ser gln arg asp gly glu arg gly arg pro pro phe leu ser pro

AAG CTT GAG CCC TCA CGG GTT TGT ATT GGT CAC AGC GAT GAT ACT GAC GAT TTG
lys leu glu pro ser arg val cys ile gly his ser asp asp thr asp asp leu

AGC TAT CTC ACC GCC CTG CTG CGC GGA TAC CTC ATC GGT CTA GAC CAC ATC CCG
ser tyr leu thr ala leu leu arg gly tyr leu ile gly leu asp his ile pro

CAC AGT GCG ATT GGT CTA GAA GAT AAT GCG AGT GCA TCA CCG CTC CTG GGC ATC
his ser ala ile gly leu glu asp asn ala ser ala ser pro leu leu gly ile

CGT TCG TGG CAA ACA CGG GCT CTC TTG ATC AAG GCG CTC ATC GAC CAA GGC TAC
arg ser trp gln thr arg ala leu leu ile lys ala leu ile asp gln gly tyr

ATG AAA CAA ATC CTC GTT TCG AAT GAC TGG CTG TTC GGG TTT TCG AGC TAT GTC
met lys gln ile leu val ser asn asp trp leu phe gly phe ser ser tyr val

ACC AAC ATC ATG GAC GTG ATG GAT CGC GTG AAC CCC GAC GGG ATG GCC TTC ATT
thr asn ile met asp val met asp arg val asn pro asp gly met ala phe ile

CCA CTG AGA GTG ATC CCA TTC TAC GAG AGA AGG GCG TCC CAC AGG AAA CGC TGC
pro leu arg val ile pro phe tyr glu arg arg ala ser his arg lys arg cys

CAG GCA TCA CTG TGA
gln ala ser leu  .
CTAACCCGGCGCGGTTCTGTGTCACCGACTTGCCGTGCATGACGCCATCTGGATCCTTCCACGCAGCGGCC
ACTATTCCCCGTCAAGATACCGAACGATGAAGTCGCGGCATCGATCGATAGGCATCTTCAATGTGATCAGGG
CTGCCACCTCCAAAGCCGGTGGCCACCCCTGTCGATAGTCTTGAGGGACGGTAGCGACGACCGTGCTTTTC
GTGAACTGCAG
3'
```

13. The transformed microorganism of claim 12 wherein said microorganism is a bacteria.

14. A transformed eukaryotic cell line comprising an expression vector for producing bacterial organophosphorus acid anhydrase wherein said vector has a cloned bacterial organophosphorus acid anhydrase gene fragment with the DNA coding sequence:

```
5'
          CTGCAGCCTGACTCGGCACCAGTCGCTGCAAGCAGAGTCGTAAGCAATCGCAAGGGGGCAGC
ATG CAA ACG AGA AGG GTT GTG CTC AAG TCT GCG GCC GCA GGA ACT CTG CTC GGC
met gln thr arg arg val val leu lys ser ala ala ala gly thr leu leu gly

GGC CTG GCT GGG TGC GCG ACG TGG CTG GAT CGA TCG GCA CAG GCG ATC GGA TCA
gly leu ala gly cys ala thr trp leu asp arg ser ala gln ala ile gly ser

ATA CGT GCG CGT CCT ATC ACA ATC TCT GAA GCG GGT TTC ACA CTG ACT CAC GAG
ile arg ala arg pro ile thr ile ser glu ala gly phe thr leu thr his glu

GAC ATC TGC GGC AGC TCG GCA GGA TTC TTG CGT GCT TGG CCA GAG TTC TTC GGT
asp ile cys gly ser ser ala gly phe leu arg ala trp pro glu phe phe gly

AGC CGC AAA GCT CTA GCG GAA AAG GCT GTG AGA GGA TTG CGC GCC AGA GCG GCT
ser arg lys ala leu ala glu lys ala val arg gly leu arg ala arg ala ala

GGC GTG CGA ACG ATT GTC GAT GTG TCG ACT TTC GAT ATC GGT CGC GAC GTC AGT
gly val arg thr ile val asp val ser thr phe asp ile gly arg asp val ser

TTA TTG GCC GAG GTT TCG CGG GCT GCC GAC GTT CAT ATC GTG GCG GCG ACC GGC
leu leu ala glu val ser arg ala ala asp val his ile val ala ala thr gly

TTG TGG TTC GAC CCG CCA CTT TCG ATG CGA TTG AGG TAT GTA GAG GAA GTC ACA
leu trp phe asp pro pro leu ser met arg leu arg tyr val glu glu leu thr

CAG TTC TTC CTG CGT GAG ATT CAA TAT GGC ATC GAA GAC ACC GGA ATT AGG GCG
gln phe phe leu arg glu ile gln tyr gly ile glu asp thr gly ile arg ala

GGC ATT ATC AAG GTC GCG ACC ACA GGC AAG GCG ACC CCC TTT CAG GAG TTA GTG
gly ile ile lys val ala thr thr gly lys ala thr pro phe gln glu leu val

TTA AAG GCG GCC GCC CGG GCC AGC TTG GCC ACC GGT GTT CCG GTA ACC ACT CAC
leu lys ala ala ala arg ala ser leu ala thr gly val pro val thr thr his

ACG GCA GCA AGT CAG CGC GAT GGT GAG CGA GGC AGG CCG CCA TTT TTG AGT CCG
thr ala ala ser gln arg asp gly glu arg gly arg pro pro phe leu ser pro

AAG CTT GAG CCC TCA CGG GTT TGT ATT GGT CAC AGC GAT GAT ACT GAC GAT TTG
lys leu glu pro ser arg val cys ile gly his ser asp asp thr asp asp leu

AGC TAT CTC ACC GCC CTG CTG CGC GGA TAC CTC ATC GGT CTA GAC CAC ATC CGG
ser tyr leu thr ala leu leu arg gly tyr leu ile gly leu asp his ile pro

CAC AGT GCG ATT GGT CTA GAA GAT AAT GCG AGT GCA TCA CCG CTC CTG GGC ATC
his ser ala ile gly leu glu asp asn ala ser ala ser pro leu leu gly ile

CGT TCG TGG CAA ACA CGG GCT CTC TTG ATC AAG GCG CTC ATC GAC CAA GGC TAC
arg ser trp gln thr arg ala leu leu ile lys ala leu ile asp gln gly tyr

ATG AAA CAA ATC CTC GTT TCG AAT GAC TGG CTG TTC GGG TTT TCG AGC TAT GTC
met lys gln ile leu val ser asn asp trp leu phe gly phe ser ser tyr val

ACC AAC ATC ATG GAC GTG ATG GAT CGC GTG AAC CCC GAC GGG ATG GCC TTC ATT
thr asn ile met asp val met asp arg val asn pro asp gly met ala phe ile

CCA CTG AGA GTG ATC CCA TTC TAC GAG AGA AGG GCG TCC CAC AGG AAA CGC TGC
pro leu arg val ile pro phe tyr glu arg arg ala ser his arg lys arg cys

CAG GCA TCA CTG TGA
gln ala ser leu  .
CTAACCCGGCGCGGTTCTGTGTCACCGACTTGCCGTGCATGACGCCATCTGGATCCTTTCCACGCAGCGGCC
ACTATTCCCCGTCAAGATACCGAACGATGAAGTCGCGCATCGATCGATAGGCATCTTCAATGTGATCAGGG
CTGCCACCTTCCAAAGCCGGTGGCCACCCCTGTCGATAGTCTTGAGGGACGGTAGCGACGACCGTGCTTTTC
GTGAACTGCAG
3'
```

15. The transformed cell line of claim 14 wherein said cell line is derived from an insect.

16. The transformed cell line of claim 15 wherein said insect is a Fall army worm caterpillar.

```
5'
          CTGCAGCCTGACTCGGCACCAGTCGCTGCAAGCAGAGTCGTAAGCAATCGCAAGGGGGCAGC
ATG CAA ACG AGA AGG GTT GTG CTC AAG TCT GCG GCC GCA GGA ACT CTG CTC GGC
met gln thr arg arg val val leu lys ser ala ala ala gly thr leu leu gly

GGC CTG GCT GGG TGC GCG ACG TGG CTG GAT CGA TCG GCA CAG GCG ATC GGA TCA
gly leu ala gly cys ala thr trp leu asp arg ser ala gln ala ile gly ser

ATA CGT GCG CGT CCT ATC ACA ATC TCT GAA GCG GGT TTC ACA CTG ACT CAC GAG
ile arg ala arg pro ile thr ile ser glu ala gly phe thr leu thr his glu

GAC ATC TGC GGC AGC TCG GCA GGA TTC TTG CGT GCT TGG CCA GAG TTC TTC GGT
asp ile cys gly ser ser ala gly phe leu arg ala trp pro glu phe phe gly

AGC CGC AAA GCT CTA GCG GAA AAG GCT GTG AGA GGA TTG CGC GCC AGA GCG GCT
ser arg lys ala leu ala glu lys ala val arg gly leu arg ala arg ala ala

GGC GTG CGA ACG ATT GTC GAT GTG TCG ACT TTC GAT ATC GGT CGC GAC GTC AGT
gly val arg thr ile val asp val ser thr phe asp ile gly arg asp val ser

TTA TTG GCC GAG GTT TCG CGG GCT GCG GAC GTT CAT ATC GTG GCG GCG ACC GGC
leu leu ala glu val ser arg ala ala asp val his ile val ala ala thr gly

TTG TGG TTC GAC CCG CCA CTT TCG ATG CGA TTG AGG TAT GTA GAG GAA CTC ACA
leu trp phe asp pro pro leu ser met arg leu arg tyr val glu glu leu thr

CAG TTC TTC CTG CGT GAG ATT CAA TAT GGC ATC GAA GAC ACC GGA ATT AGG GCG
gln phe phe leu arg glu ile gln tyr gly ile glu asp thr gly ile arg ala

GGC ATT ATC AAG GTC GCG ACC ACA GGC AAG GCG ACC CCC TTT CAG GAG TTA GTG
gly ile ile lys val ala thr thr gly lys ala thr pro phe gln glu leu val

TTA AAG GCG GCC GCC CGG GCC AGC TTG GCC ACC GGT GTT CCG GTA ACC ACT CAC
leu lys ala ala ala arg ala ser leu ala thr gly val pro val thr thr his

ACG GCA GCA AGT CAG CGC GAT GGT GAG CGA GGC AGG CGG CCA TTT TTG AGT CCG
thr ala ala ser gln arg asp gly glu arg gly arg pro pro phe leu ser pro

AAG CTT GAG CCC TCA CGG GTT TGT ATT GGT CAC AGC GAT GAT ACT GAC GAT TTG
lys leu glu pro ser arg val cys ile gly his ser asp asp thr asp asp leu

AGC TAT CTC ACG GCC CTG CTG CGC GGA TAC TTC ATC GGT CTA GAC CAC ATC GCG
ser tyr leu thr ala leu leu arg gly tyr leu ile gly leu asp his ile pro

CAC AGT GCG ATT GGT CTA GAA GAT AAT GCG AGT GCA TCA CCG CTC CTG GGC ATC
his ser ala ile gly leu glu asp asn ala ser ala ser pro leu leu gly ile

CGT TCG TGG CAA ACA CGG GCT CTC TTG ATC AAG GCG CTC ATC GAC CAA GGC TAC
arg ser trp gln thr arg ala leu leu ile lys ala leu ile asp gln gly tyr

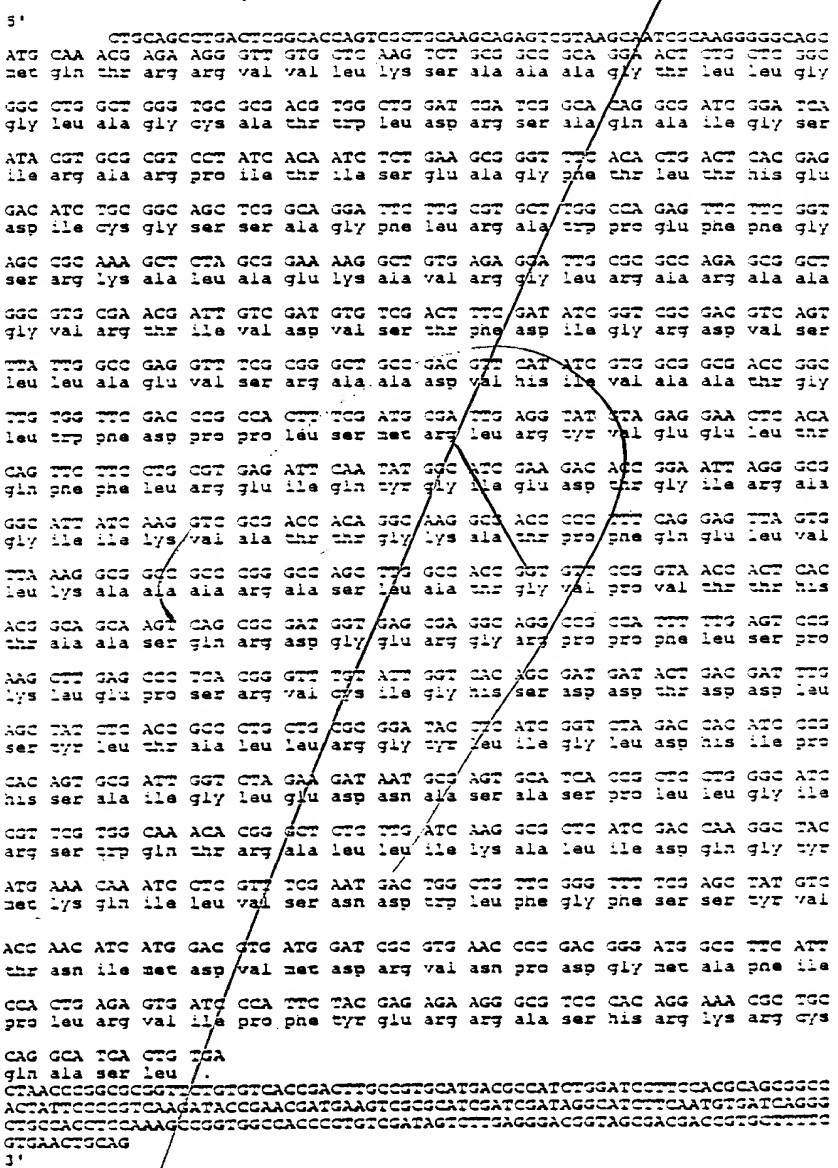
ATG AAA CAA ATC CTC GTT TCG AAT GAC TGG CTG TTC GGG TTT TCG AGC TAT GTC
met lys gln ile leu val ser asn asp trp leu phe gly phe ser ser tyr val

ACC AAC ATC ATG GAC GTG ATG GAT CGC GTG AAC CCC GAC GGG ATG GCC TTC ATT
thr asn ile met asp val met asp arg val asn pro asp gly met ala phe ile

CCA CTG AGA GTG ATC CCA TTC TAC GAG AGA AGG GCG TCC CAC AGG AAA CGC TGC
pro leu arg val ile pro phe tyr glu arg arg ala ser his arg lys arg cys

CAG GCA TCA CTG TGA
gln ala ser leu  .
CTAACCCGGCGCGGTTCTGTGTCACCGACTTGCCGTGCATGACGCCATCTGGATCCTTCCACGCAGCGGCC
ACTATTCCCGGGTCAAGATACCGAACGATGAAGTCGCGCATCGATCGATAGGCATCTTCAATGTGATCAGGG
CTGCCACCTCCAAAGCCGGTGGCCACCCCTGTCGATAGTCTTGAGGGACGGTAGCGACGACCGTGCTTTTC
GTGAACTGCAG
3'
```

17. A transgenic eukaryotic organism comprising an expression vector for producing bacterial organophosphorus acid anhydrase wherein said vector has a cloned bacterial organophosphorus acid anhydrase gene fragment having the DNA coding sequence:

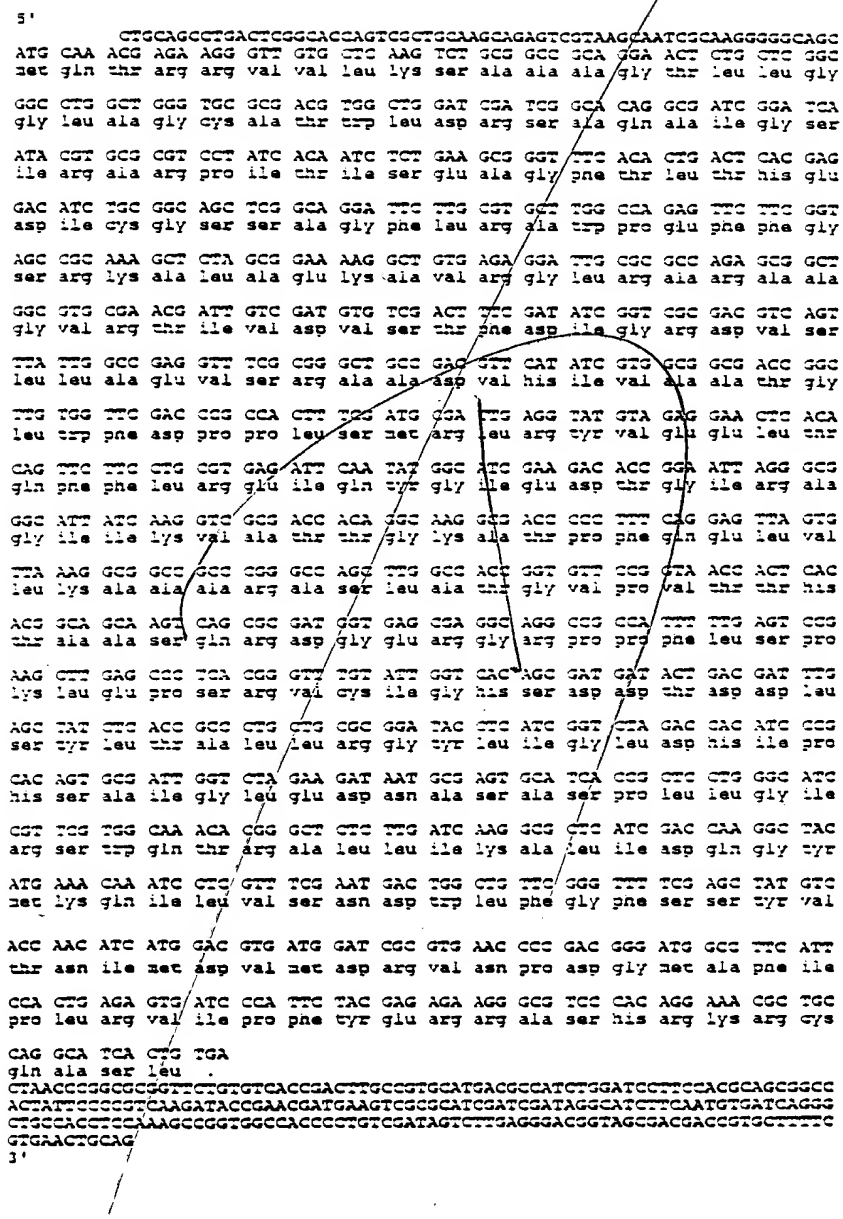


18. A transgenic organism as claimed in claim 17 wherein said organism is derived from microinjection of said expression vector into Drusophila melanogaster embryo cells.

19. A transgenic organism as claimed in claim 17 wherein said organism is derived from injection of said expression vector into a Fall army worm caterpillar.

20. A method for making bacterial organophosphorus acid anhydrase, said method comprising:

growing in a nutrient medium a transformed microorganism having an expression vector with a cloned bacterial organophosphorus acid anhydrase gene fragment having the DNA coding sequence:



allowing said microorganism to produce bacterial organophosphorus acid anhydrase; and

recovering the bacterial organophosphorus acid anhydrase.

21. A method for making bacterial organophosphorus acid anhydrase, said method comprising:

growing in a nutrient medium a transformed eukaryotic cell line comprising an expression vector with a cloned bacterial organophosphorus acid anhydrase gene fragment having the DNA coding sequence:

```
5'
          CTGCAGCCTGACTCGGCACCAGTCGCTGCAAGCAGAGTCGTAAGCAATCGCAAGGGGGCAGC
ATG CAA ACG AGA AGG GTT GTG GTC AAG TCT GCG GCC GCA GGA ACT CTG CTC GGC
met gln thr arg arg val val leu lys ser ala ala ala gly thr leu leu gly

GGC CTG GCT GGG TGC GCG ACG TGG CTG GAT CGA TCG GCA CAG GCG ATC GGA TCA
gly leu ala gly cys ala thr trp leu asp arg ser ala gln ala ile gly ser

ATA CGT GCG CGT CCT ATC ACA ATC TCT GAA GCG GGT TTC ACA CTG ACT CAC GAG
ile arg ala arg pro ile thr ile ser glu ala gly phe thr leu thr his glu

GAC ATC TGC GGC AGC TCG GCA GGA TTC TTT CGT GCT TGG CCA GAG TTC TTC GGT
asp ile cys gly ser ser ala gly phe leu arg ala trp pro glu phe phe gly

AGC CGC AAA GCT CTA GCG GAA AAG GCT GTG AGA GGA TTG CGC GCC AGA GCG GCT
ser arg lys ala leu ala glu lys ala val arg gly leu arg ala arg ala ala

GGC GTC CGA ACG ATT GTC GAT GTG TCG ACT TTC GAT ATC GGT CGC GAC GTC AGT
gly val arg thr ile val asp val ser thr phe asp ile gly arg asp val ser

TTA TTG GCC GAG GTT TCG CGG GCT GCC GAC GTT CAT ATC GTG GCG GCG ACC GGC
leu leu ala glu val ser arg ala ala asp val his ile val ala ala thr gly

TTG TGG TTC GAC CCG CCA GTT TCG ATG CGA TTG AGG TAT GTA GAG GAA GTC ACA
leu trp phe asp pro pro leu ser met arg leu arg tyr val glu glu leu thr

CAG TTC TTC CTG CGT GAG ATT CAA TAT GGC ATC GAA GAC ACC GGA ATT AGG GCG
gln phe phe leu arg glu ile gln tyr gly ile glu asp thr gly ile arg ala

GGC ATT ATC AAG GTC GCG ACC ACA GGC AAG GCG ACC CCC TTT CAG GAG TTA GTG
gly ile ile lys val ala thr thr gly lys ala thr pro phe gln glu leu val

TTA AAG GCG GCC GCC CGG GCC AGC TTG GCC ACC GGT GTT CCG GTA ACC ACT CAC
leu lys ala ala ala arg ala ser leu ala thr gly val pro val thr thr his

ACG GCA GCA AGT CAG CGC GAT GGT GAG CGA GGC AGG CCG CCA TTT TTG AGT CCG
thr ala ala ser gln arg asp gly glu arg gly arg pro pro phe leu ser pro

AAG CTT GAG CCC TCA CGG GTT TGT ATT GGT CAC AGC GAT GAT ACT GAC GAT TTG
lys leu glu pro ser arg val cys ile gly his ser asp asp thr asp asp leu

AGC TAT CTC ACC GCC CTG CTG CGC GGA TAC TTC ATC GGT CTA GAC CAC ATC CCG
ser tyr leu thr ala leu leu arg gly tyr leu ile gly leu asp his ile pro

CAC AGT GCG ATT GGT CTA GAA GAT AAT GCG AGT GCA TCA CCG CTC CTG GGC ATC
his ser ala ile gly leu glu asp asn ala ser ala ser pro leu leu gly ile

CGT TCG TGG CAA ACA CGG GCT CTC TTG ATC AAG GCG CTC ATC GAC CAA GGC TAC
arg ser trp gln thr arg ala leu leu ile lys ala leu ile asp gln gly tyr

ATG AAA CAA ATC CTC GTT TCG AAT GAC TGG CTG TTC GGG TTT TCG AGC TAT GTC
met lys gln ile leu val ser asn asp trp leu phe gly phe ser ser tyr val

ACC AAC ATC ATG GAC GTG ATG GAT CGC GTG AAC CCC GAC GGG ATG GCC TTC ATT
thr asn ile met asp val met asp arg val asn pro asp gly met ala phe ile

CCA CTG AGA GTG ATC CCA TTC TAC GAG AGA AGG GCG TCC CAC AGG AAA CGC TGC
pro leu arg val ile pro phe tyr glu arg arg ala ser his arg lys arg cys

CAG GCA TCA CTG TGA
gln ala ser leu  .
CTAACCGGGCGCGGTTCTGTGTCACCGACTTGCCGTGCATGACGCCATCTGGATCCTTCCACGCAGCGGCC
ACTATTCCCCGTCAAGATACCGAACGATGAAGTCGCGCATCGATCGATAGGCATCTTCAATGTGATCAGGG
CTGCGACGTCGAAAGCCGGTGGCCACCCCTGTCGATAGTCTTGAGGGACGGTAGCGACGACGGTGCTTTTC
GTGAACTGCAG
3'
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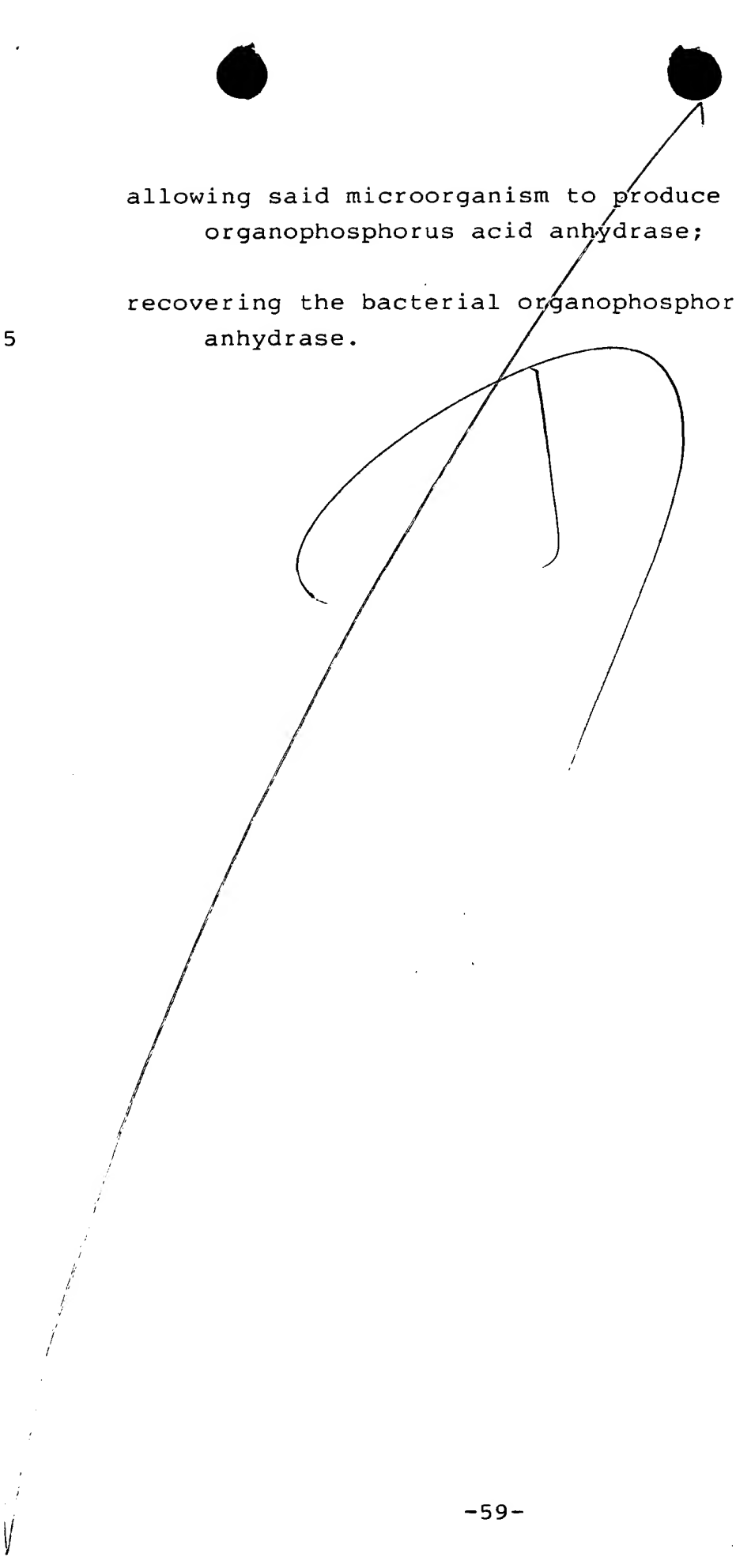
allowing said microorganism to produce bacterial organophosphorus acid anhydrase; and

recovering the bacterial organophosphorus acid anhydrase.



22. A method for making bacterial organophosphorus acid anhydrase, said method comprising:

nourishing a transformed host in a nutrient medium allowing said host to produce bacterial organophosphorus acid anhydrase;

transforming host an expression vector comprising a DNA sequence coding for said bacterial organophosphorus acid anhydrase, and

separating the bacterial organophosphorus acid anhydrase from said host and said nutrient medium.

23. The method for making bacterial organophosphorus acid anhydrase of claim 22 further comprising purifying said bacterial organophosphorus acid anhydrase.

24. The method for making bacterial organophosphorus acid anhydrase of claim 22 wherein said host is a microorganism.

25. The method for making bacterial organophosphorus acid anhydrase of claim 24 wherein said microorganism is a bacteria.

26. The method for making bacterial organophosphorus acid anhydrase of claim 22 wherein said host is a eukaryotic cell line.

27. The method for making bacterial organophosphorus acid anhydrase of claim 26 wherein said eukaryotic cell line is derived from an insect.

28. The method for making bacterial organophosphorus acid anhydrase of claim 27 wherein said insect is a Fall army worm caterpillar.

29. The method of claim 22 wherein said anhydrase is purified to a level of approximately 3200 units/mg of anhydrase.

30. The cloned bacterial organophosphorus acid anhydrase gene fragment of claim 1 where in the N-terminal sequence up to the start codon has been deleted from said DNA coding sequence.

31. The expression vector of claim 6 wherein the N-terminal sequence up to the start codon has been deleted from said DNA coding sequence.

32. The transformed microorganism of claim 12 wherein the N-terminal sequence up to the start codon has been deleted from said DNA coding sequence.

33. The transformed eukaryotic cell line of claim 14 wherein the N-terminal sequence up to the start codon has been deleted from said DNA coding sequence.

34. The transgenic eukaryotic organism of claim 17 wherein the N-terminal sequence up to the start codon has been deleted from said DNA coding sequence.

35. The method for making bacterial organophosphorus acid anhydrase of claim 20 wherein the N-terminal sequence up to the start codon has been deleted from said DNA coding sequence.

36. The method for making bacterial organophosphorus acid anhydrase of claim 21 wherein the N-terminal sequence up to the start codon has been deleted from said DNA coding sequence.

37. The cloned bacterial organophosphorus acid anhydrase gene fragment of claim 1 wherein the C-terminal sequence has been deleted from Bam HI to PstI of said DNA coding sequence.

38. The expression vector of claim 6 wherein the C-terminal sequence has been deleted from Bam HI to PstI of said DNA coding sequence.

39. The transformed microorganism of claim 12 wherein the C-terminal sequence has been deleted from Bam HI to PstI of said DNA coding sequence.

40. The transformed eukaryotic cell line of claim 14 wherein the C-terminal sequence has been deleted from Bam HI to PstI of said DNA coding sequence.

41. The transgenic eukaryotic organism of claim 17 wherein the C-terminal sequence has been deleted from Bam HI to PstI of said DNA coding sequence.

42. The method for making bacterial organophosphorus acid anhydrase of claim 20 wherein the C-terminal sequence has been deleted from Bam HI to PstI of said DNA coding sequence.

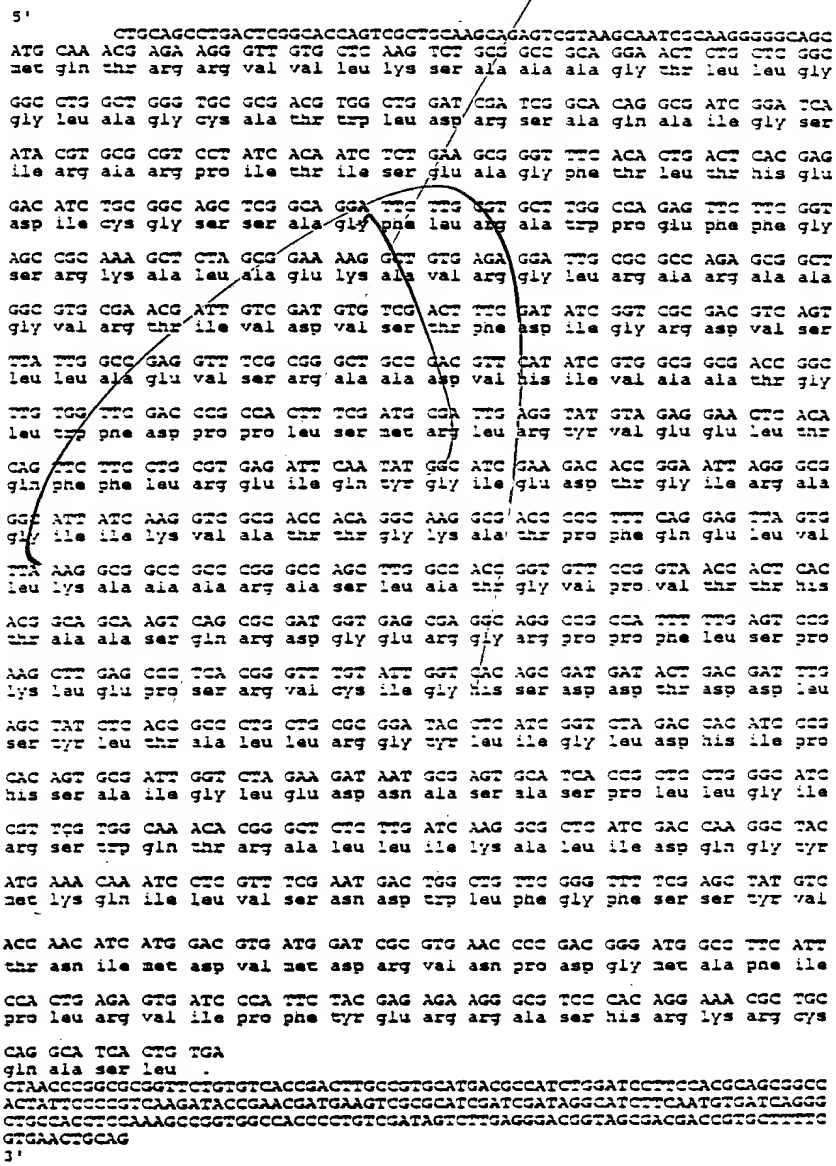
43. The method for making bacterial organophosphorus acid anhydrase of claim 21 wherein the C-terminal sequence has been deleted from Bam HI to PstI of said DNA coding sequence.

44. Organophosphorus acid anhydrase produced by a genetically transformed host having an expression vector comprising a DNA sequence coding for said anhydrase.

improp. dependent claim. no ante cedent basis for the method

45. The method of claim 44 wherein said anhydrase is characterized by K_{cat} = 2100 sec^{-1} for paraoxon.

46. Bacterial organophosphorus acid anhydrase produced by a genetically transformed host having an expression vector comprising a cloned gene fragment with the DNA coding sequence:



47. The bacterial organophosphorus acid anhydrase of claim 46 wherein the N-terminal sequence up to the start codon has been deleted from said DNA coding sequence.

48. The bacterial organophosphorus acid anhydrase of claim 46 wherein the C-terminal sequence up to the start codon; has been deleted from Bam HI to PstI of said DNA coding sequence.

49. The bacterial organophosphorus acid anhydrase of claim 46 wherein said host producing acid anhydrase is a microorganism.

50. The bacterial organophosphorus acid anhydrase of claim 46 wherein said host producing said anhydrase is a bacterial.

51. The bacterial organophosphorus acid anhydrase of claim 46 wherein said host is a eukaryatic cell line.

52. The bacterial organophosphorus acid anhydrase of claim 46 wherein said anhydrase is relatively pure, characterized by K_{cat} = 2100 sec^{-1} for paraoxon.

53. A method for detoxifying an organophosphorus compound comprising exposing said compound to recombinant bacterial organophosphorus acid anhydrase.

54. The method of claim 53 wherein said exposure is accomplished by passing said compound through a matrix comprising said recombinant anhydrase.

55. The method of claim 54 wherein said matrix is further comprised of a filtration device.

56. The method of claim 55 wherein said device is a gas mask.

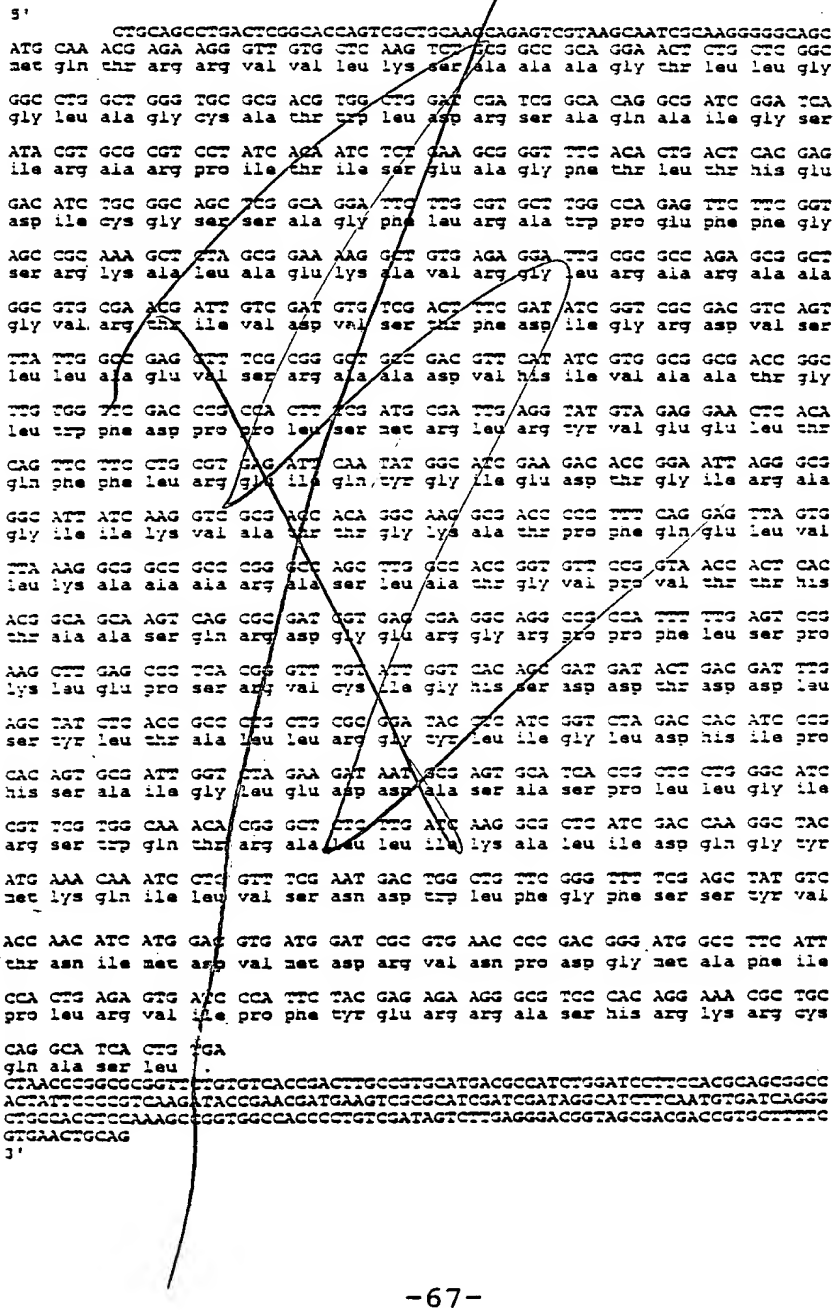
57. The method of claim 53 wherein said organophosphorus compound is in air.

58. The method of claim 53 wherein said organophosphorus compound is in a fluid.

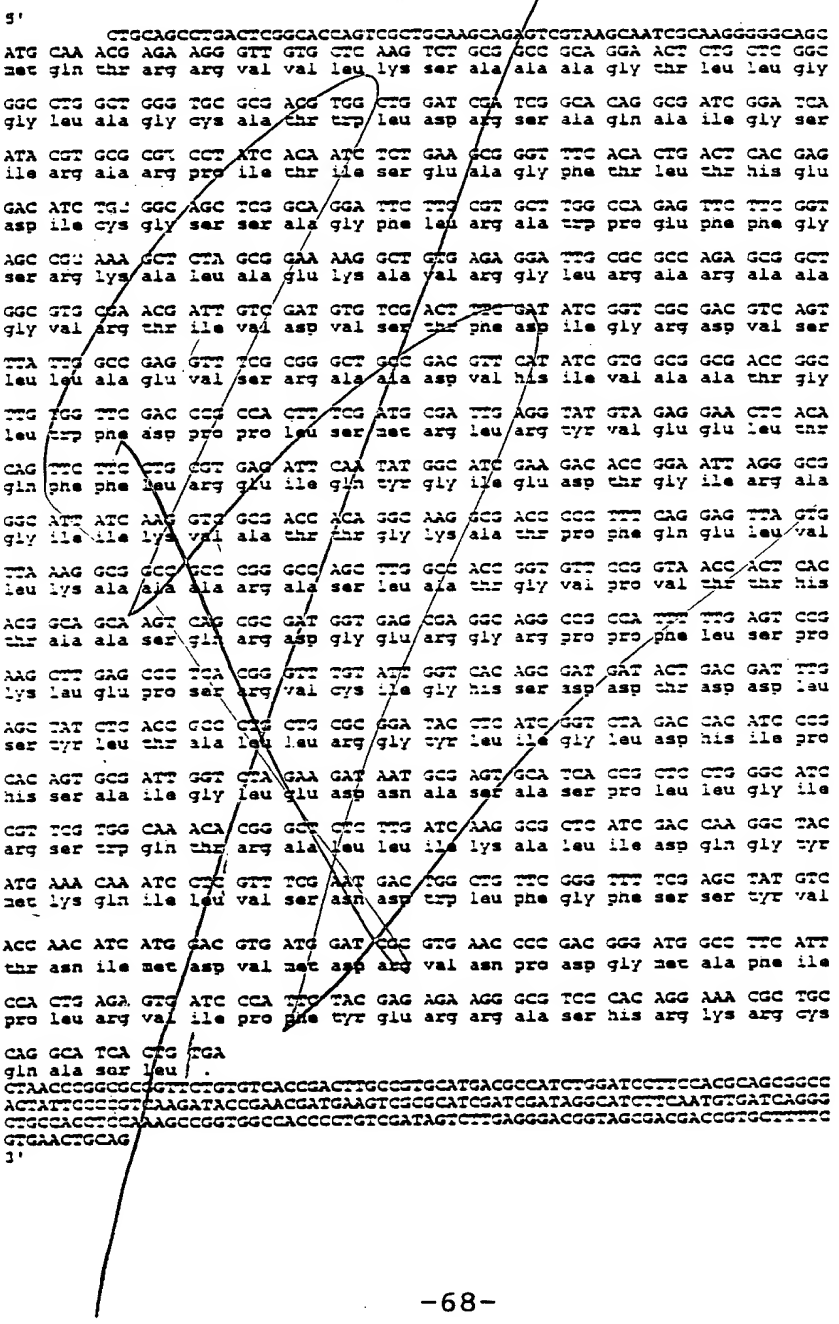
59. The method of claim 53 wherein said exposure is accomplished by spraying said recombinant anhydrase on a locus comprising the organophosphorus compound.

60. The method of claim 53 wherein said exposure is accomplished by introducing said anhydrase into a container comprising the organophosphorus compound.

61. The method of claim 53 wherein said recombinant bacterial organophosphorus acid anhydrase is produced by a transformed microorganism comprising an expression vector for producing said anhydrase and wherein said vector has a cloned bacterial organophosphorus acid anhydrase gene fragment with the DNA coding sequence:



62. The method of claim 53 wherein said recombinant bacterial organophosphorus acid anhydrase is produced by a transformed eukaryotic cell line comprising an expression vector for producing said anhydrase and wherein said vector has a cloned bacterial organophosphorus acid anhydrase gene fragment with the DNA coding sequence:



63. The method of claim 53 wherein said recombinant bacterial organophosphorus acid anhydrase is produced by a transgenic eukaryotic organism comprising an expression vector for producing said anhydrase wherein said vector has a cloned bacterial organophosphorus acid anhydrase gene fragment with the DNA coding sequence:

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5'
          CTGCAGCCTGACTGGCCACCAGTCGCTGCAAGCAGAGTCGTAAGCAATCGCAAGGGGGCAGC
ATG CAA ACG AGA AGG GTT GTG CTC AAG TCT GCG GCC GCA GGA ACT CTG CTC GGC
met gln thr arg arg val val leu lys ser ala ala ala gly thr leu leu gly

GGC CTG GCT GGA TGC GCG ACG TGG CTG GAT CGA TCG GCA CAG GCG ATC GGA TCA
gly leu ala gly cys ala thr trp leu asp arg ser ala gln ala ile gly ser

ATA CGT GCG CGT CCT ATC ACA ATC TCT GAA GCG GGT TTC ACA CTG ACT CAC GAG
ile arg ala arg pro ile thr ile ser glu ala gly phe thr leu thr his glu

GAC ATC TGC GGC AGC TCG GCA GGA TTC TTG CGT GCT TGG CCA GAG TTC TTC GGT
asp ile cys gly ser ser ala gly phe leu arg ala trp pro glu phe phe gly

AGC CGC AAA GCT CTA GCG GAA AAG GCT GTG AGA GGA TTG CGC GCC AGA GCG GCT
ser arg lys ala leu ala glu lys ala val arg gly leu arg ala arg ala ala

GGC GTG CGA ACG ATT GTC GAT GTG TCG ACT TTC GAT ATC GGT CGC GAC GTC AGT
gly val arg thr ile val asp val ser thr phe asp ile gly arg asp val ser

TTA TTG GCC GAG GTT TCG CGG GCT GCC GAC GTT CAT ATC GTG GCG GCG ACC GGC
leu leu ala glu val ser arg ala ala asp val his ile val ala ala thr gly

TTG TGG TTC GAC GCG CCA CTT TCG ATG CGA TTG AGG TAT GTA GAG GAA CTC ACA
leu trp phe asp pro pro leu ser met arg leu arg tyr val glu glu leu thr

CAG TTC TTT CTG CGT GAG ATT CAA TAT GGC ATC GAA GAC ACC GGA ATT AGG GCG
gln phe phe leu arg glu ile gln tyr gly ile glu asp thr gly ile arg ala

GGC ATT ATC AAG GTC GCG ACC ACA GGC AAG GCG ACC CGC TTT CAG GAG TTA GTG
gly ile ile lys val ala thr thr gly lys ala thr pro phe gln glu leu val

TTA AAG GCG GCC GCC CGG GCC AGC TTG GCC ACC GGT GTT GCG GTA ACC ACT CAC
leu lys ala ala ala arg ala ser leu ala thr gly val pro val thr thr his

ACG GCA GCA AGT CAG CGC GAT GGT GAG CGA GGC AGG CCG CCA TTT TTG AGT CCG
thr ala ala ser gln arg asp gly glu arg gly arg pro pro phe leu ser pro

AAG CTT GAG CCC TCA GGG GTC TGT ATT GGT CAC AGC GAT GAT ACT GAC GAT TTG
lys leu glu pro ser arg val cys ile gly his ser asp asp thr asp asp leu

AGC TAT CTC ACC GCG CTG CTG CGC GGA TAC TTC ATC GGT CTA GAC CAC ATC CCG
ser tyr leu thr ala leu leu arg gly tyr leu ile gly leu asp his ile pro

CAC AGT GCG ATT GGT CTA GAA GAT AAT GCG AGT GCA TCA CCG CTC CTG GGC ATC
his ser ala ile gly leu glu asp asn ala ser ala ser pro leu leu gly ile

CGT TCG TGG CAA ACA CGG GCT CTC TTG ATC AAG GCG CTC ATC GAC CAA GGC TAC
arg ser trp gln thr arg ala leu leu ile lys ala leu ile asp gln gly tyr

ATG AAA CAA ATC CTC GTT TCC AAT GAC TGG CTG TTC GGG TTT TCG AGC TAT GTC
met lys gln ile leu val ser asn asp trp leu phe gly phe ser ser tyr val

ACC AAC ATC ATG GAC GTG ATG GAT CGC GTG AAC CCC GAC GGG ATG GCC TTC ATT
thr asn ile met asp val met asp arg val asn pro asp gly met ala phe ile

CCA CTG AGA GTG ATC CCA TTC TAC GAG AGA AGG GCG TCC CAC AGG AAA CGC TGC
pro leu arg val ile pro phe tyr glu arg arg ala ser his arg lys arg cys

CAG GCA TCA CTG TGA
gln ala ser leu  .
CTAACCGGGCGCGGTTCTGTGTCACCGACTTGCCGTGCATGACGCCATCTGGATCCTTCCACGCAGCGGCC
ACTATTCCCCGTCAAGATACCGAACGATGAAGTCGCGCATCGATCGATAGGCATCTTCAATGTGATCAGGG
CTGCCACCTCGAAAGCCGGTGGCCACCCCTGTCGATAGTCTTGAGGGACGGTAGCGACGACCGTGCTTTTC
GTGAACTGCAG
3'
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64. A method of preventing poisoning of a locus by an organophosphorus compound by applying recombinant organophosphorus acid anhydrase to said locus before said compound contacts said locus.

65. A method of detecting bacterial colonies capable of detoxifying organophosphorus acid anhydrides, comprising employing a transformed microorganism as a control in a plate assay wherein said microorganism is comprised of an expression vector for producing organophosphorus acid anhydrase and said vector is comprised of a cloned gene fragment containing the DNA coding sequence for the anhydrase.

66. The method of claim 65 wherein said anhydrides comprise a pesticide and said plate assay is conducted prior to applying said pesticide to soil to quantitate the number of microorganisms capable of detoxifying said pesticides in said soil.

67. A method for protecting insects from organophosphorus compounds comprising feeding said insects recombinant organophosphorus acid anhydrase.

68. A method for protecting insects from organophosphorus compounds comprising infecting insects with microorganisms comprised of an expression vector for producing an organophosphorus acid anhydrase wherein said vector is comprised of a cloned gene fragment containing the DNA coding sequence for the anhydrase.

69. A method for protecting insects from organophosphorus compounds comprising introducing into the environment of said insects microorganisms comprised of an expression vector for producing an organophosphorus acid anhydrase wherein said vector is comprised of a cloned gene fragment containing the DNA coding sequence of the anhydrase.

70. A pesticide comprising an organophosphorus compound and an inhibitor of bacterial organophosphorus acid anhydrase.

add A4

add B2

add B2